



STIC Search Report

Biotech-Chem Library

STIC Database Tracking Number: 204024

TO: Eugenia Wang
Location: Remsen 6c61
Wednesday, October 11, 2006
Art Unit: 1745
Phone: 571-272-4942
Serial Number: 10 / 529993

From: Jan Delaval
Location: EIC 1700
Remsen 4a30
Phone: 571-272-2504

jan.delaval@uspto.gov

Search Notes

Anekwe, Imelda (ASRC)

204024

From: EUGENIA WANG [eugenia.wang@uspto.gov]
Sent: Thursday, October 05, 2006 5:02 PM
To: STIC-EIC1700
Subject: Database Search Request, Serial Number: 10/529993

Requester:
EUGENIA WANG (P/1745)
Art Unit:
GROUP ART UNIT 1745
Employee Number:
82927
Office Location:
REM 06C61
Phone Number:
(571)272-4942
Mailbox Number:

SCIENTIFIC REFERENCE BR
Sci & Tech Inf. Cnt.
OCT 6 RECD
& T.M. Office

Case serial number:
10/529993
Class / Subclass(es):
429/33
Earliest Priority Filing Date:
October 4, 2002
Format preferred for results:
Paper
Search Topic Information:
polymer with polyazole with precursors:

Jan
10/14/06

(1) 2,3-diamino-5-carboxyphenylsulfonic acid, 2,3-diamino-6-carboxyphenylsulfonic acid, or 3,4-diamino-6-carboxyphenylsulfonic acid

(2) aromatic tricarboxylic acids, their C1-C20-alkyl esters or C5-C12-aryl esters or their acid anhydrides or their acid halides or tetracarboxylic acids, their C1-C20-alkyl esters or C5-C12-aryl esters or their acid anhydrides or their acid halides

(3) 1,3,5-benzenetricarboxylic acid (trimesic acid); ✓
2,4,5-benzenetricarboxylic acid (trimellitic acid); ✓
(2-carboxyphenyl)iminodiacetic acid, 3,5,3'-biphenyltricarboxylic acid;
3,5,4'-biphenyltricarboxylic acid, 2,4,6-pyridinetricarboxylic acid,
benzene-1,2,4,5-tetracarboxylic acid; naphthalene-1,4,5,8-tetracarboxylic
acid, 3,5,3',5'-biphenyltetracarboxylic acid, benzophenonetetracarboxylic acid,
3,3',4,4'-biphenyltetracarboxylic acid, 2,2',3,3'-biphenyltetracarboxylic acid,
1,2,5,6-naphthalenetetracarboxylic acid or 1,4,5,8-naphthalenetetracarboxylic
acid

~ It would be nice to one in each group, but any would be nice. Thanks!

Special Instructions and Other Comments:
7 am - 4:30 pm M-R

=> d his

(FILE 'REGISTRY' ENTERED AT 07:19:50 ON 11 OCT 2006)

E C7H8N2O5S/MF

L1 2 S E3 AND C6/ES AND 1/NR AND DIAMINO

L2 13 S 554-95-0 OR 89-05-4 OR 863495-62-9 OR 128-97-2 OR 536-20-9 OR

FILE 'HCAPLUS' ENTERED AT 07:32:53 ON 11 OCT 2006

ACT WANG529/A

L3 (87)SEA FILE=HCAPLUS ABB=ON PLU=ON POLYAZOLE

L4 (1)SEA FILE=HCAPLUS ABB=ON PLU=ON POLY AZOLE

L5 (126)SEA FILE=HCAPLUS ABB=ON PLU=ON ?POLYAZOL? OR ?POLY AZOL?

L6 126 SEA FILE=HCAPLUS ABB=ON PLU=ON (L3 OR L4 OR L5)

L7 0 S L6 AND L1

L8 1 S L6 AND L2

L9 6 S L6 AND CARBOXYL?/CW,CT

L10 1 S L6 AND ?TRICARBOXYL?

L11 2 S L6 AND ?TETRACARBOXYL?

L12 6 S L6 AND ?DICARBOXYL?

L13 9 S L8-L12

L14 9 S L13 AND (PY<=2002 OR PRY<=2002 OR AY<=2002)

L15 2 S L14 AND L8,L10,L11

L16 6 S L14 AND (CALUNDANN ? OR BENICEWICZ ? OR UENSAL ? OR KIEFER ?

L17 6 S L14 AND CELANESE?/PA,CS

L18 7 S L15-L17

L19 2 S L14 NOT L18

FILE 'REGISTRY' ENTERED AT 07:41:05 ON 11 OCT 2006

=> fil reg

FILE 'REGISTRY' ENTERED AT 07:41:40 ON 11 OCT 2006

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

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Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 10 OCT 2006 HIGHEST RN 910095-75-9

DICTIONARY FILE UPDATES: 10 OCT 2006 HIGHEST RN 910095-75-9

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH June 30, 2006

Please note that search-term pricing does apply when conducting SmartSELECT searches.

REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For information on property searching in REGISTRY, refer to:

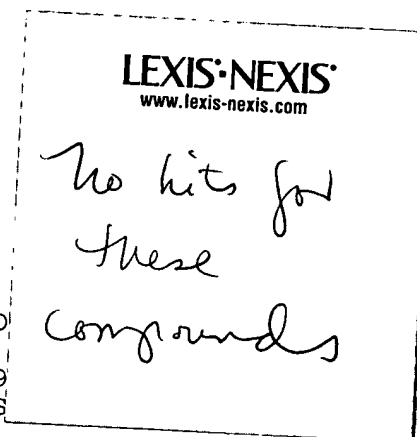
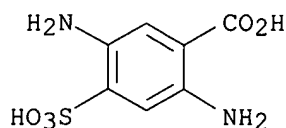
<http://www.cas.org/ONLINE/UG/regprops.html>

=> d ll ide can tot

L1 ANSWER 1 OF 2 REGISTRY COPYRIGHT 2006 ACS on STN

jan delaval - 11 october 2006

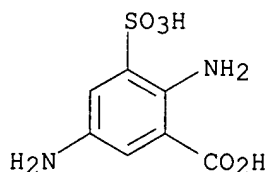
RN 193205-93-5 REGISTRY
ED Entered STN: 28 Aug 1997
CN **Benzoic acid, 2,5-diamino-4-sulfo-** (9CI) (CA INDEX NAME)
OTHER NAMES:
CN 1,4-Phenylenediamine-2-carboxy-5-sulfonic acid
MF **C7 H8 N2 O5 S**
SR CA
LC STN Files: CA, CAPLUS, USPATFULL



**PROPERTY DATA AVAILABLE IN THE 'PROP' FO
1 REFERENCES IN FILE CA (19
1 REFERENCES IN FILE CAPLUS

REFERENCE 1: 127:150206

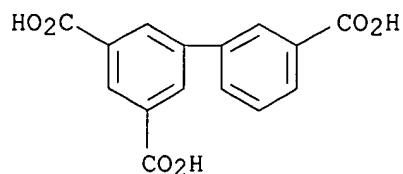
L1 ANSWER 2 OF 2 REGISTRY COPYRIGHT 2006 ACS on STN
RN 21591-44-6 REGISTRY
ED Entered STN: 16 Nov 1984
CN **Benzoic acid, 2,5-diamino-3-sulfo-** (8CI) (CA INDEX NAME)
MF **C7 H8 N2 O5 S**



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

=> d 12 ide can tot

L2 ANSWER 1 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **863495-62-9** REGISTRY
ED Entered STN: 20 Sep 2005
CN [1,1'-Biphenyl]-3,3',5-tricarboxylic acid (9CI) (CA INDEX NAME)
MF **C15 H10 O6**
SR CA
LC STN Files: CA, CAPLUS

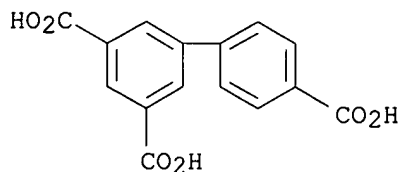


PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:251017

L2 ANSWER 2 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **677010-20-7** REGISTRY
ED Entered STN: 27 Apr 2004
CN [1,1'-Biphenyl]-3,4',5-tricarboxylic acid (9CI) (CA INDEX NAME)
MF C15 H10 O6
SR CA
LC STN Files: CA, CAPLUS, USPATFULL



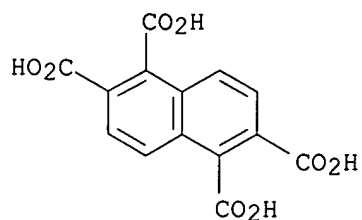
PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:251017

REFERENCE 2: 140:306759

L2 ANSWER 3 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **39155-64-1** REGISTRY
ED Entered STN: 16 Nov 1984
CN 1,2,5,6-Naphthalenetetracarboxylic acid (9CI) (CA INDEX NAME)
MF C14 H8 O8
LC STN Files: BEILSTEIN*, CA, CAPLUS, CASREACT, IFICDB, IFIUDB, TOXCENTER, USPATFULL
(*File contains numerically searchable property data)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

8 REFERENCES IN FILE CA (1907 TO DATE)
8 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:251017

REFERENCE 2: 140:306759

REFERENCE 3: 133:150208

REFERENCE 4: 125:151127

REFERENCE 5: 121:255429

REFERENCE 6: 121:204986

REFERENCE 7: 119:180549

REFERENCE 8: 78:15903

L2 ANSWER 4 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN **36966-22-0** REGISTRY

ED Entered STN: 16 Nov 1984

CN [1,1'-Biphenyl]-2,2',3,3'-tetracarboxylic acid (9CI) (CA INDEX NAME)

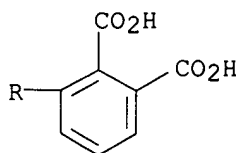
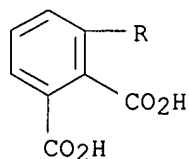
OTHER NAMES:

CN 2,2',3,3'-Tetracarboxybiphenyl

MF C16 H10 O8

CI COM

LC STN Files: BEILSTEIN*, CA, CAPLUS, CASREACT, IFICDB, IFIUDB, USPATFULL
(*File contains numerically searchable property data)

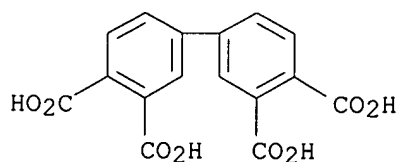


PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

13 REFERENCES IN FILE CA (1907 TO DATE)
13 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:251017
REFERENCE 2: 142:155392
REFERENCE 3: 140:306759
REFERENCE 4: 133:296849
REFERENCE 5: 133:193837
REFERENCE 6: 132:308133
REFERENCE 7: 131:258078
REFERENCE 8: 125:151127
REFERENCE 9: 111:133784
REFERENCE 10: 77:153271

L2 ANSWER 5 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN 22803-05-0 REGISTRY
ED Entered STN: 16 Nov 1984
CN [1,1'-Biphenyl]-3,3',4,4'-tetracarboxylic acid (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 3,3',4,4'-Biphenyltetracarboxylic acid (8CI)
OTHER NAMES:
CN 3,3',4,4'-Biphenyltetracarboxylate acid
CN 3,4,3',4'-Biphenyltetracarboxylic acid
DR 101516-77-2
MF C16 H10 O8
CI COM
LC STN Files: BEILSTEIN*, CA, CAPLUS, CASREACT, CHEMCATS, CHEMLIST, IFICDB,
IFIPAT, IFIUDB, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)



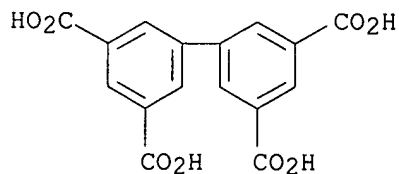
PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

86 REFERENCES IN FILE CA (1907 TO DATE)
9 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
86 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 145:115170

REFERENCE 2: 144:468599
REFERENCE 3: 144:458696
REFERENCE 4: 144:433152
REFERENCE 5: 144:360714
REFERENCE 6: 144:285126
REFERENCE 7: 144:204529
REFERENCE 8: 144:88712
REFERENCE 9: 143:460019
REFERENCE 10: 143:377620

L2 ANSWER 6 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **4371-28-2** REGISTRY
ED Entered STN: 16 Nov 1984
CN [1,1'-Biphenyl]-3,3',5,5'-tetracarboxylic acid (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 3,3',5,5'-Biphenyltetracarboxylic acid (8CI)
OTHER NAMES:
CN 3,5,3',5'-Biphenyltetracarboxylic acid
CN 5,5'-Biisophthalic acid
MF C16 H10 O8
CI COM
LC STN Files: BEILSTEIN*, CA, CAPLUS, CASREACT, USPATFULL
(*File contains numerically searchable property data)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

17 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
17 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 144:36793
REFERENCE 2: 143:373941
REFERENCE 3: 143:251017
REFERENCE 4: 142:272791
REFERENCE 5: 142:75412
REFERENCE 6: 140:306759

REFERENCE 7: 137:148014

REFERENCE 8: 135:258211

REFERENCE 9: 128:192442

REFERENCE 10: 128:147340

L2 ANSWER 7 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN **2479-49-4** REGISTRY

ED Entered STN: 16 Nov 1984

CN 1,2-Benzenedicarboxylic acid, 4,4'-carbonylbis- (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN Phthalic acid, 4,4'-carbonyldi- (7CI, 8CI)

OTHER NAMES:

CN 3,3',4,4'-Benzophenonetetracarboxylic acid

CN 3,3',4,4'-Tetracarboxybenzophenone

CN 4,4'-Carbonyldiphthalic acid

CN Benzophenonetetracarboxylic acid

DR 50976-11-9, 50986-44-2, 114367-57-6, 72252-62-1

MF C17 H10 O9

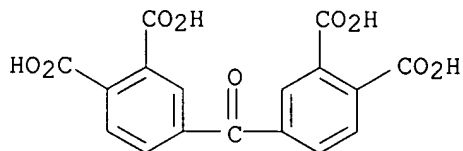
CI COM

LC STN Files: ANABSTR, BEILSTEIN*, BIOSIS, CA, CAOLD, CAPLUS, CASREACT, CHEMCATS, CHEMLIST, CIN, CSChem, IFICDB, IFIPAT, IFIUDB, MEDLINE, PROMT, TOXCENTER, USPAT2, USPATFULL

(*File contains numerically searchable property data)

Other Sources: EINECS**, NDSL**, TSCA**

(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

150 REFERENCES IN FILE CA (1907 TO DATE)

36 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

150 REFERENCES IN FILE CAPLUS (1907 TO DATE)

9 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 145:95172

REFERENCE 2: 145:64579

REFERENCE 3: 144:468599

REFERENCE 4: 144:398397

REFERENCE 5: 144:351931

REFERENCE 6: 144:254503

REFERENCE 7: 144:171703

REFERENCE 8: 144:141250

REFERENCE 9: 143:479110

REFERENCE 10: 143:471908

L2 ANSWER 8 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN 1147-65-5 REGISTRY

ED Entered STN: 16 Nov 1984

CN Benzoic acid, 2-[bis(carboxymethyl)amino]- (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN Acetic acid, [(o-carboxyphenyl)imino]di- (6CI, 7CI)

CN Anthranilic acid, N,N-bis(carboxymethyl)- (8CI)

OTHER NAMES:

CN 2-(Carboxyphenyl)iminodiacetic acid

CN ANDA

CN Anthranil-N,N-diacetic acid

CN Anthranildiacetic acid

CN Anthranilic-N,N-diacetic acid

CN N,N-Bis(carboxymethyl)anthranilic acid

CN N-(2-Carboxyphenyl)iminodiacetic acid

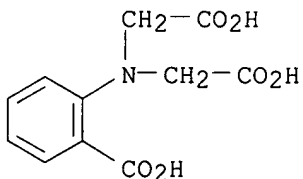
CN N-(o-Carboxyphenyl)iminodiacetic acid

CN N-Carboxymethyl-N-(2-carboxyphenyl)glycine

MF C11 H11 N O6

CI COM

LC STN Files: BEILSTEIN*, CA, CAOLD, CAPLUS, CASREACT, CHEMCATS, CSCHEM,
GMELIN*, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

122 REFERENCES IN FILE CA (1907 TO DATE)

35 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

122 REFERENCES IN FILE CAPLUS (1907 TO DATE)

20 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 143:431503

REFERENCE 2: 143:251017

REFERENCE 3: 141:371184

REFERENCE 4: 141:32853

REFERENCE 5: 140:433186

REFERENCE 6: 140:306759

REFERENCE 7: 138:407548

REFERENCE 8: 137:345260

REFERENCE 9: 136:170507

REFERENCE 10: 136:39159

L2 ANSWER 9 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN 554-95-0 REGISTRY

ED Entered STN: 16 Nov 1984

CN 1,3,5-Benzenetricarboxylic acid (8CI, 9CI) (CA INDEX NAME)

OTHER NAMES:

CN 1,3,5-Tricarboxybenzene

CN 5-Carboxyisophthalic acid

CN NSC 3998

CN Trimesic acid

CN Trimesinic acid

CN Trimesitinic acid

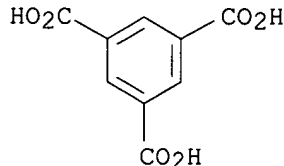
MF C9 H6 O6

CI COM

LC STN Files: AGRICOLA, ANABSTR, BEILSTEIN*, BIOSIS, BIOTECHNO, CA, CAOLD, CAPLUS, CASREACT, CBNB, CHEMCATS, CHEMLIST, CIN, CSCHEM, DDFU, DETHERM*, DRUGU, EMBASE, GMELIN*, IFICDB, IFIPAT, IFIUDB, MEDLINE, MSDS-OHS, NAPRALERT, PIRA, PROMT, SPECINFO, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)

Other Sources: EINECS**, NDSL**, TSCA**

(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1114 REFERENCES IN FILE CA (1907 TO DATE)

114 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

1119 REFERENCES IN FILE CAPLUS (1907 TO DATE)

31 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 145:327120

REFERENCE 2: 145:317637

REFERENCE 3: 145:272526

REFERENCE 4: 145:259682

REFERENCE 5: 145:249644

REFERENCE 6: 145:230266

REFERENCE 7: 145:222785

REFERENCE 8: 145:211326

REFERENCE 9: 145:201296

REFERENCE 10: 145:201284

L2 ANSWER 10 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN 536-20-9 REGISTRY

ED Entered STN: 16 Nov 1984

CN 2,4,6-Pyridinetricarboxylic acid (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

OTHER NAMES:

CN 2,4,6-Tricarboxypyridine

CN NSC 403251

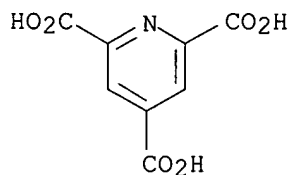
CN Trimesitic acid

MF C8 H5 N O6

CI COM

LC STN Files: BEILSTEIN*, CA, CAOLD, CAPLUS, CASREACT, IFICDB, IFIPAT,
IFIUDB, USPATFULL

(*File contains numerically searchable property data)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

68 REFERENCES IN FILE CA (1907 TO DATE)

5 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

68 REFERENCES IN FILE CAPLUS (1907 TO DATE)

16 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 145:317384

REFERENCE 2: 145:39369

REFERENCE 3: 144:424610

REFERENCE 4: 144:265914

REFERENCE 5: 144:245950

REFERENCE 6: 144:139237

REFERENCE 7: 143:251017

REFERENCE 8: 143:240948

REFERENCE 9: 143:205039

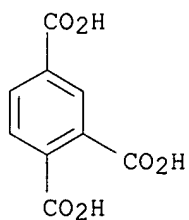
REFERENCE 10: 143:145062

L2 ANSWER 11 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN

RN 528-44-9 REGISTRY

ED Entered STN: 16 Nov 1984

CN 1,2,4-Benzenetricarboxylic acid (8CI, 9CI) (CA INDEX NAME)
 OTHER NAMES:
 CN 1,2,4-Tricarboxybenzene
 CN 1,3,4-Benzenetricarboxylic acid
 CN 1,4,5-Benzenetricarboxylic acid
 CN 4-Carboxyphthalic acid
 CN F-TMA
 CN NSC 72986
 CN Trimellitic acid
 MF C9 H6 O6
 CI COM
 LC STN Files: AGRICOLA, ANABSTR, BEILSTEIN*, BIOSIS, CA, CAOLD, CAPLUS,
 CASREACT, CBNB, CHEMCATS, CHEMLIST, CIN, CSCHEM, CSNB, DETHERM*, EMBASE,
 ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN*, IFICDB, IFIPAT,
 IFIUDB, MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, PIRA, PROMT, RTECS*,
 SPECINFO, TOXCENTER, USPAT2, USPATFULL, VTB
 (*File contains numerically searchable property data)
 Other Sources: EINECS**, NDSL**, TSCA**
 (**Enter CHEMLIST File for up-to-date regulatory information)

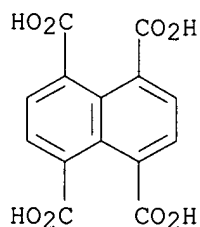


PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1946 REFERENCES IN FILE CA (1907 TO DATE)
 572 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
 1952 REFERENCES IN FILE CAPLUS (1907 TO DATE)
 58 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 145:317637
 REFERENCE 2: 145:300470
 REFERENCE 3: 145:294293
 REFERENCE 4: 145:278432
 REFERENCE 5: 145:278066
 REFERENCE 6: 145:273070
 REFERENCE 7: 145:265855
 REFERENCE 8: 145:259119
 REFERENCE 9: 145:252030
 REFERENCE 10: 145:222785

L2 ANSWER 12 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **128-97-2** REGISTRY
ED Entered STN: 16 Nov 1984
CN 1,4,5,8-Naphthalenetetracarboxylic acid (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)
OTHER NAMES:
CN 1,4,5,8-Tetracarboxynaphthalene
CN NSC 66207
CN Tetra acid
MF C14 H8 O8
CI COM
LC STN Files: AGRICOLA, ANABSTR, BEILSTEIN*, BIOSIS, CA, CAOLD, CAPLUS, CASREACT, CHEMCATS, CHEMINFORMRX, CHEMLIST, CSCHEM, IFICDB, IFIPAT, IFIUDB, MEDLINE, MSDS-OHS, RTECS*, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)
Other Sources: EINECS**, NDSL**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



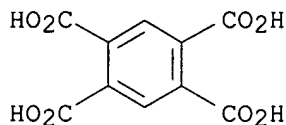
PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

217 REFERENCES IN FILE CA (1907 TO DATE)
8 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
217 REFERENCES IN FILE CAPLUS (1907 TO DATE)
11 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 144:128538
REFERENCE 2: 143:477846
REFERENCE 3: 143:415097
REFERENCE 4: 143:398227
REFERENCE 5: 143:251017
REFERENCE 6: 141:259978
REFERENCE 7: 140:306759
REFERENCE 8: 140:296883
REFERENCE 9: 140:102010
REFERENCE 10: 140:59275

L2 ANSWER 13 OF 13 REGISTRY COPYRIGHT 2006 ACS on STN
RN **89-05-4** REGISTRY

ED Entered STN: 16 Nov 1984
CN 1,2,4,5-Benzenetetracarboxylic acid (8CI, 9CI) (CA INDEX NAME)
OTHER NAMES:
CN 1,2,4,5-Tetracarboxybenzene
CN NSC 6369
CN Pyromellitic acid
MF C10 H6 O8
CI COM
LC STN Files: AGRICOLA, ANABSTR, BEILSTEIN*, BIOSIS, CA, CAOLD, CAPLUS,
CASREACT, CBNB, CHEMCATS, CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, DDFU,
DETERM*, DRUGU, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN*,
HSDB*, IFICDB, IFIPAT, IFIUDB, MEDLINE, MRCK*, MSDS-OHS, PIRA, PROMT,
RTECS*, SPECINFO, TOXCENTER, TULSA, USPAT2, USPATFULL, VTB
(*File contains numerically searchable property data)
Other Sources: EINECS**, NDSL**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1425 REFERENCES IN FILE CA (1907 TO DATE)
238 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
1429 REFERENCES IN FILE CAPLUS (1907 TO DATE)
38 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 145:317637
REFERENCE 2: 145:294293
REFERENCE 3: 145:271601
REFERENCE 4: 145:222785
REFERENCE 5: 145:211462
REFERENCE 6: 145:200196
REFERENCE 7: 145:198792
REFERENCE 8: 145:193423
REFERENCE 9: 145:177589
REFERENCE 10: 145:146325

=> fil hcaplus

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FILE LAST UPDATED: 9 Oct 2006 (20061009/ED)

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L22 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:307322 HCAPLUS

DN 140:322530

TI Proton-conductive polymer membranes from phosphonated **polyazoles** for use in fuel cells

IN Calundann, Gordon; Sansone, Michael; Benicewicz, Brian; Choe, Eui Won; Uensal, Oemer; Kiefer, Joachim

PA Celanese Ventures GmbH, Germany

SO Ger. Offen., 29 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	DE 10246459	A1	20040415	DE 2002-10246459	20021004	<--
	CA 2500514	AA	20040422	CA 2003-2500514	20031002	<--
	WO 2004033079	A2	20040422	WO 2003-EP10906	20031002	<--
	WO 2004033079	A3	20040923			
	W: BR, CA, CN, JP, KR, MX, US					
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR					
EP	1554032	A2	20050720	EP 2003-775169	20031002	<--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK					
JP	2006501991	T2	20060119	JP 2004-542403	20031002	<--
CN	1726071	A	20060125	CN 2003-80100918	20031002	<--
US	2006008690	A1	20060112	US 2005-530002	20050822	<--
PRAI	DE 2002-10246459	A	20021004	<--		
	WO 2003-EP10906	W	20031002			

AB The title membranes, which are inexpensive, are prepared easily by heating precursors for phosphonated **polyazoles** in polyphosphoric acid under inert gases to $\leq 350^\circ$, applying films of the resulting solution to supports, and treating these films until they are self-supporting.

IC ICM C08J0005-22

ICS C08J0007-12; B01D0071-68; C08L0081-06; C08L0079-06; H01M0008-02
 CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 52
 ST phosphonated **polyazole** membrane fuel cell; proton conductive
 membrane fuel cell; polyphosphoric acid phosphonated **polyazole**
 membrane manuf
 IT Amines, uses
 RL: TEM (Technical or engineered material use); USES (Uses)
 ((hetero)aromatic tetra-, polymers with (hetero)aromatic polycarboxylic
 acids; proton-conductive polymer membranes from phosphonated
polyazoles for use in fuel cells)
 IT **Carboxylic acids, uses**
 RL: TEM (Technical or engineered material use); USES (Uses)
 (dicarboxylic, (hetero)aromatic, polymers with (hetero)aromatic
 tetramines; proton-conductive polymer membranes from phosphonated
polyazoles for use in fuel cells)
 IT Polyphosphoric acids
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical
 process); PROC (Process)
 (polyazole membrane manufacture in polyphosphoric acid)
 IT Fuel cells
 Membranes, nonbiological
 (proton-conductive polymer membranes from phosphonated
polyazoles for use in fuel cells)
 IT 13598-36-2D, Phosphonic acid, **polyazole** derivs.
 RL: TEM (Technical or engineered material use); USES (Uses)
 (proton-conductive polymer membranes from phosphonated
polyazoles for use in fuel cells)

L22 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:307316 HCAPLUS

DN 140:322529

TI Proton-conductive polymer membranes comprising sulfonated
polyazoles for use in fuel cells

IN Calundann, Gordon; Sansone, Michael; Benicewicz,
 Brian; Choe, Eui Won; Uensal, Oemer; Kiefer,
 Joachim

PA Celanese Ventures GmbH, Germany

SO Ger. Offen., 25 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10246373	A1	20040415	DE 2002-10246373	20021004 <--
	CA 2500784	AA	20040422	CA 2003-2500784	20031002 <--
	WO 2004034499	A2	20040422	WO 2003-EP10904	20031002 <--
	WO 2004034499	A3	20050512		
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,				
	IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	EP 1552574	A2	20050713	EP 2003-748106	20031002 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				
	IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	CN 1720632	A	20060111	CN 2003-80100919	20031002 <--
	JP 2006502265	T2	20060119	JP 2004-542401	20031002 <--
	US 2006183012	A1	20060817	US 2005-529993	20050412 <--
PRAI	DE 2002-10246373	A	20021004	<--	
	WO 2003-EP10904	W	20031002		

AB The title membranes are prepared by dissolving precursors for sulfonated **polyazoles** in polyphosphoric acid, heating under inert gases to temps. $\leq 350^\circ$, applying films of the resulting solution to supports, and treating the resulting film until it is self-supporting.

IC ICM B01D0071-62
ICS H01M0008-02; H01M0004-86

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST **polyazole** sulfonated membrane fuel cell; membrane proton conductive fuel cell

IT Amines, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(hetero)aromatic tetra-, polymers with (hetero)aromatic polycarboxylic acids; proton-conductive polymer membranes comprising sulfonated **polyazoles** for use in fuel cells)

IT **Carboxylic acids, uses**
RL: TEM (Technical or engineered material use); USES (Uses)
(dicarboxylic, (hetero)aromatic, polymers with (hetero)aromatic tetramines; proton-conductive polymer membranes comprising sulfonated **polyazoles** for use in fuel cells)

IT Sulfonic acids, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**polyazole** derivs.; proton-conductive polymer membranes comprising sulfonated **polyazoles** for use in fuel cells)

IT Fuel cells
Membranes, nonbiological
(proton-conductive polymer membranes comprising sulfonated **polyazoles** for use in fuel cells)

IT Polyphosphoric acids
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(proton-conductive polymer membranes comprising sulfonated **polyazoles** prepared in polyphosphoric acid)

L22 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:287993 HCAPLUS

DN 140:306759

TI **Polyazole**-based proton-conducting membrane for fuel cell use

IN Calundann, Gordon; Benicewicz, Brian; Baurmeister, Jochen

PA Celanese Ventures G.m.b.H., Germany; Pemeas GmbH

SO PCT Int. Appl., 44 pp.
CODEN: PIXXD2

DT Patent
LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004030135	A2	20040408	WO 2003-EP9198	20030820 <--
	WO 2004030135	A3	20050512		
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	DE 10242708	A1	20040519	DE 2002-10242708	20020913 <--
	CA 2498370	AA	20040408	CA 2003-2498370	20030820 <--
	EP 1550174	A2	20050706	EP 2003-747913	20030820 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	CN 1689186	A	20051026	CN 2003-821673	20030820 <--
	JP 2005538237	T2	20051215	JP 2004-538814	20030820 <--

US 2006035095 A1 20060216 US 2005-527649 20051020 <--
 PRAI DE 2002-10242708 A 20020913 <--
 WO 2003-EP9198 W 20030820

AB The invention relates to novel proton-conducting and **polyazole** conducting polymer membrane based on the **polyazoles** and to the use thereof as a polymer electrolyte-membrane (PEM) for the production of membrane-electrode-units for PEM-fuel cells. The invention also relates to other molded bodies based on the **polyazoles**.

IC ICM H01M0008-10
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38

ST **polyazole** based proton conducting membrane fuel cell

IT Amines, processes
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (aromatic, tetra-; **polyazole**-based proton-conducting membrane for fuel cell use)

IT **Carboxylic acids, processes**
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (dicarboxylic, aromatic; **polyazole**-based proton-conducting membrane for fuel cell use)

IT Heterocyclic compounds
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
 (nitrogen, five-membered, polymers; **polyazole**-based proton-conducting membrane for fuel cell use)

IT Fuel cell electrolytes
 (polyazole-based proton-conducting membrane for fuel cell use)

IT Polybenzimidazoles
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (polyazole-based proton-conducting membrane for fuel cell use)

IT Polybenzothiazoles
 Polybenzoxazoles
 Polyoxadiazoles
 Polyquinoxalines
 RL: DEV (Device component use); USES (Uses)
 (polyazole-based proton-conducting membrane for fuel cell use)

IT Fuel cells
 (solid electrolyte; **polyazole**-based proton-conducting membrane for fuel cell use)

IT 88-99-3, Phthalic acid, processes 89-05-4, Benzene 1,2,4,5-tetracarboxylic acid 91-95-2, 3,3',4,4'-Tetraaminobiphenyl 99-31-0, 5-Aminoisophthalic acid 100-21-0, Terephthalic acid, processes 100-26-5, Pyridine-2,5-dicarboxylic acid 100-31-2, 4,4'-Stilbenedicarboxylic acid 121-91-5, Isophthalic acid, processes 122-05-4, 2,5-Pyrazinedicarboxylic acid 128-97-2, Naphthalene-1,4,5,8-tetracarboxylic acid 482-05-3, Diphenic acid 499-80-9, Pyridine-2,4-dicarboxylic acid 499-81-0, Pyridine-3,5-dicarboxylic acid 499-83-2, Pyridine-2,6-dicarboxylic acid 528-44-9, Trimellitic acid 536-20-9, 2,4,6-Pyridine tricarboxylic acid 554-95-0, Trimesic acid 605-70-9, 1,4-Naphthalenedicarboxylic acid 610-92-4, 2,5-Dihydroxyterephthalic acid 618-83-7, 5-Hydroxyisophthalic acid 636-46-4, 4-Hydroxyisophthalic acid 636-94-2, 2-Hydroxyterephthalic acid

652-03-9, Tetrafluorophthalic acid 652-36-8, Tetrafluoroterephthalic acid 787-70-2, Biphenyl-4,4'-dicarboxylic acid 835-58-5, 4-Trifluoromethylphthalic acid 964-68-1, Benzophenone-4,4'-dicarboxylic acid 1141-38-4, 2,6-Naphthalenedicarboxylic acid 1147-65-5 1171-47-7, 2,2-Bis(4-carboxyphenyl)hexafluoropropane 1551-39-9, Tetrafluoroisophthalic acid 1583-66-0, 5-Fluoroisophthalic acid 1583-67-1, 3-Fluorophthalic acid 1779-05-1, 3,3',4,4'-Tetraaminodiphenylmethane 2089-89-6, 2,7-Naphthalenedicarboxylic acid 2215-89-6, Diphenyl ether-4,4'-dicarboxylic acid 2449-35-6, Diphenylsulfone-4,4'-dicarboxylic acid 2479-49-4, Benzophenonetetracarboxylic acid 2676-59-7, 3,3',4,4'-Tetraaminodiphenylether 3112-31-0, 3,5-Pyrazole dicarboxylic acid 3204-61-3, 1,2,4,5-Tetraaminobenzene 3209-07-2, 3,5-Dihydroxyphthalic acid 3786-46-7, 3,6-Dihydroxyphthalic acid 3906-87-4 4371-28-2, 3,5,3',5'-Biphenyltetracarboxylic acid 4861-72-7, 5-(N,N-Dimethylamino)isophthalic acid 5007-67-0, 3,3',4,4'-Tetraaminobenzophenone 7315-96-0, 1,5-Naphthalenedicarboxylic acid 13224-79-8, 3,3',4,4'-Tetraaminodiphenylsulfone 19438-88-1 19675-63-9, 4-Carboxycinnamic acid 19829-72-2, 2,3-Dihydroxy-1,4-benzenedicarboxylic acid 36966-22-0 37645-41-3, 2,4-Pyrimidinedicarboxylic acid 38926-45-3, 2,3,5,6-Tetraaminopyridine 39155-64-1, 1,2,5,6-Naphthalenetetracarboxylic acid 59195-28-7, 2,5-Pyridinedicarboxylic acid, 4-phenyl- 82784-82-5, 3,4-Dihydroxyphthalic acid 603993-70-0 677010-19-4, 5-(N,N-Diethylamino)isophthalic acid 677010-20-7
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(polyazole-based proton-conducting membrane for fuel cell use)

IT 129-00-0D, Pyrene, Tetraza derivs. polymers 25013-01-8, Polypyridine 128611-69-8, 1,3,4-Thiadiazole homopolymer 190201-51-5, Pyrimidine homopolymer

RL: DEV (Device component use); USES (Uses)

(polyazole-based proton-conducting membrane for fuel cell use)

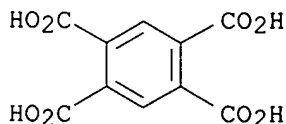
IT 89-05-4, Benzene 1,2,4,5-tetracarboxylic acid 128-97-2, Naphthalene-1,4,5,8-tetracarboxylic acid 528-44-9, Trimellitic acid 536-20-9, 2,4,6-Pyridine tricarboxylic acid 554-95-0, Trimesic acid 1147-65-5 2479-49-4, Benzophenonetetracarboxylic acid 4371-28-2, 3,5,3',5'-Biphenyltetracarboxylic acid 36966-22-0 39155-64-1, 1,2,5,6-Naphthalenetetracarboxylic acid 677010-20-7

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

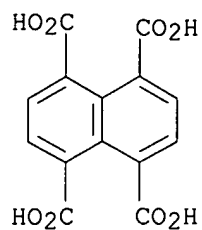
(polyazole-based proton-conducting membrane for fuel cell use)

RN 89-05-4 HCAPLUS

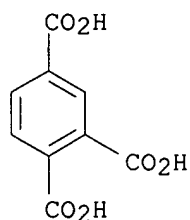
CN 1,2,4,5-Benzenetetracarboxylic acid (8CI, 9CI) (CA INDEX NAME)



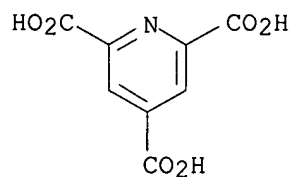
RN 128-97-2 HCAPLUS
CN 1,4,5,8-Naphthalenetetracarboxylic acid (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



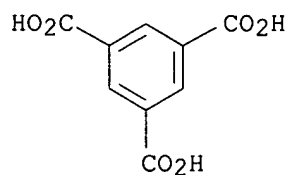
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CN 1,2,4-Benzenetricarboxylic acid (8CI, 9CI) (CA INDEX NAME)



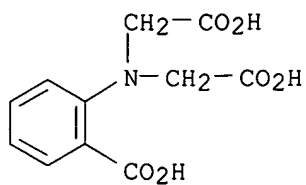
RN 536-20-9 HCAPLUS
CN 2,4,6-Pyridinetricarboxylic acid (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



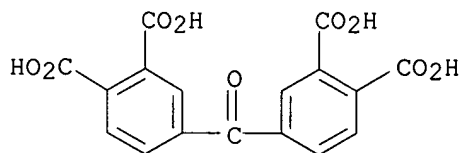
RN 554-95-0 HCAPLUS
CN 1,3,5-Benzenetricarboxylic acid (8CI, 9CI) (CA INDEX NAME)



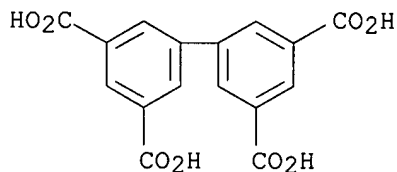
RN 1147-65-5 HCAPLUS
CN Benzoic acid, 2-[bis(carboxymethyl)amino]- (9CI) (CA INDEX NAME)



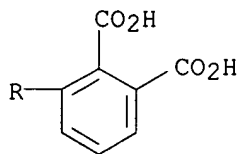
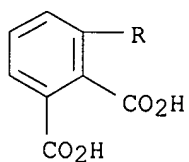
RN 2479-49-4 HCAPLUS
 CN 1,2-Benzenedicarboxylic acid, 4,4'-carbonylbis- (9CI) (CA INDEX NAME)



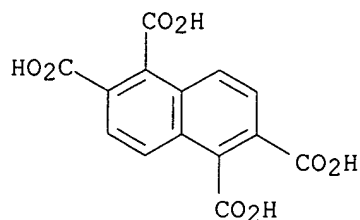
RN 4371-28-2 HCAPLUS
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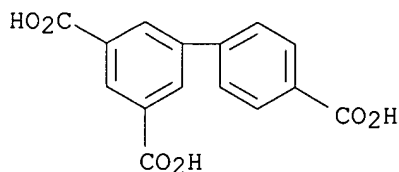
RN 36966-22-0 HCAPLUS
 CN [1,1'-Biphenyl]-2,2',3,3'-tetracarboxylic acid (9CI) (CA INDEX NAME)



RN 39155-64-1 HCAPLUS
 CN 1,2,5,6-Naphthalenetetracarboxylic acid (9CI) (CA INDEX NAME)



RN 677010-20-7 HCAPLUS
 CN [1,1'-Biphenyl]-3,4',5-tricarboxylic acid (9CI) (CA INDEX NAME)



L22 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:253148 HCAPLUS
 DN 140:287870
 TI Production of improved proton-conducting **polyazole** membranes for use in fuel cells
 IN **Kiefer, Joachim; Uensal, Oemer; Calundann, Gordon;** Leister, Ursula; Brehl, Kilian; Thiemer, Edmund; Schlegel, Melanie
 PA **Celanese Ventures GmbH, Germany**
 SO PCT Int. Appl., 49 pp.
 CODEN: PIXXD2
 DT Patent
 LA German
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004024796	A1	20040325	WO 2003-EP9018	20030814 <--
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	DE 10239701	A1	20040311	DE 2002-10239701	20020829 <--
	DE 10330461	A1	20050203	DE 2003-10330461	20030705
	CA 2496589	AA	20040325	CA 2003-2496589	20030814 <--
	EP 1537164	A1	20050608	EP 2003-794874	20030814 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	JP 2005537384	T2	20051208	JP 2004-571736	20030814 <--
	US 2006127705	A1	20060615	US 2005-524194	20050822 <--
PRAI	DE 2002-10239701	A	20020829	<--	
	DE 2003-10330461	A	20030705		
	WO 2003-EP9018	W	20030814		
AB	In the title process, which is economical and gives high-quality membranes, mixts. of polyphosphoric acid (I) and polyazoles or their precursors are heated to ≤400°, coated on supports, and treated with hydrolysis liqs. containing P or S oxyacids. Heating 2,5-pyridinedicarboxylic acid 125, terephthalic acid 375, and				

3,3',4,4'-biphenyltetramine 500 mmol in 468 g I at 190-220° for 12 h and adding 600 g 85% H₃PO₄ gave a solution of poly(2,2'-p-phenylene-5,5'-bibenzimidazole)-co-poly(6,6'-bibenzimidazol-2,2'-diyl)-2,5-pyridine (inherent viscosity 3.2 dL/g) which was coated (500 µm) on a PET film and dipped in 40% H₃PO₄ at room temperature to give hydrolysis [n(H₃PO₄)/n(polymer)] of 29.7, 18.4, 17.2, and 11.5 after 0.25, 1, 4, and 20 h, resp.

- IC ICM C08G0073-18
 CC 35-5 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 52
 ST proton conducting membrane **polyazole**; fuel cell membrane proton conducting; bibenzimidazole deriv membrane proton conducting; pyridine deriv membrane proton conducting; **pyridinedicarboxylic acid** copolymer proton conducting; terephthalic acid copolymer proton conducting; biphenyltetramine copolymer proton conducting
 IT Hydrolysis
 (acid; acid hydrolysis of **polyazole** membranes)
 IT Fuel cells
 (production of improved proton-conducting **polyazole** membranes for use in fuel cells)
 IT Polybenzimidazoles
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
 (production of improved proton-conducting **polyazole** membranes for use in fuel cells)
 IT Membranes, nonbiological
 (proton-conducting; production of improved proton-conducting **polyazole** membranes)
 IT Polyphosphoric acids
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
 (solvents for production of **polyazole** membranes)
 IT 6303-21-5, Phosphinic acid 7664-38-2, Phosphoric acid, processes 7664-93-9, Sulfuric acid, processes 7782-99-2, Sulfurous acid, processes 7803-60-3, Hypophosphoric acid 13598-36-2, Phosphonic acid 20267-10-1, Hypophosphonic acid 33669-61-3, Disulfurous acid
 RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
 (acid hydrolysis of **polyazole** membranes)
 IT 25584-58-1 28576-59-2 56411-22-4 56713-21-4 675130-04-8
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
 (production of improved proton-conducting **polyazole** membranes for use in fuel cells)
 IT 12408-02-5, Hydrogen ion, miscellaneous
 RL: MSC (Miscellaneous)
 (production of improved proton-conducting **polyazole** membranes for use in fuel cells)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Kiefer, J	2003			WO 03022412 A	HCAPLUS
Mex, L	2003			WO 03007411 A	HCAPLUS
Wen-Fang, H	1992			US 5098985 A	HCAPLUS

L22 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:198205 HCAPLUS

DN 140:236732
 TI Preparation and use of **polyazole** films
 IN Calundann, Gordon; Kiefer, Joachim; Uensal, Oemer
 PA Celanese Ventures G.m.b.H., Germany
 SO Ger. Offen., 29 pp.
 CODEN: GWXXBX
 DT Patent
 LA German
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10239701	A1	20040311	DE 2002-10239701	20020829 <--
	CA 2496589	AA	20040325	CA 2003-2496589	20030814 <--
	CA 2496593	AA	20040325	CA 2003-2496593	20030814 <--
	WO 2004024796	A1	20040325	WO 2003-EP9018	20030814 <--
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	WO 2004024797	A1	20040325	WO 2003-EP9020	20030814 <--
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
EP	1537164	A1	20050608	EP 2003-794874	20030814 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
EP	1537165	A1	20050608	EP 2003-794875	20030814 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
CN	1678662	A	20051005	CN 2003-820364	20030814 <--
CN	1678663	A	20051005	CN 2003-820427	20030814 <--
JP	2005537380	T2	20051208	JP 2004-535087	20030814 <--
JP	2005537384	T2	20051208	JP 2004-571736	20030814 <--
US	2005256296	A1	20051117	US 2005-525590	20050524 <--
US	2006127705	A1	20060615	US 2005-524194	20050822 <--
PRAI	DE 2002-10239701	A	20020829	<--	
	DE 2003-10330461	A	20030705		
	WO 2003-EP9018	W	20030814		
	WO 2003-EP9020	W	20030814		

AB The title films, which have good use properties and are readily prepared, are prepared by polymerizing aromatic tetraamines with aromatic polycarboxylic acids or

their esters in polyphosphoric acid, forming films of the resulting mixts. on substrates, heating at $\leq 350^\circ$ (preferably $\leq 280^\circ$) in an inert atmospheric, separating the film from the substrate, removing (poly)phosphoric acid, and drying. The **polyazoles** can contain, e.g., 5,5'-bibenzimidazole, benzodipyrrozole, or 1,5-benzimidazolediy groups.

IC ICM C08J0005-22
 ICS C08L0079-06

CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 28

ST film **polyazole** prepn use; bibenzimidazole deriv polymer film prepn use; benzodipyrrozole deriv polymer film prepn use; polybenzimidazolediy film prepn use

IT **Carboxylic acids, uses**

RL: TEM (Technical or engineered material use); USES (Uses)
 (aromatic polybasic, polymers with aromatic tetraamines; preparation and use of **polyazole** films)

IT Amines, uses

RL: TEM (Technical or engineered material use); USES (Uses)
(aromatic, tetra-, polymers with aromatic polybasic acids; preparation and use

of

polyazole films)

IT Plastic films

(preparation and use of **polyazole** films)

IT Polyphosphoric acids

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(preparation of **polyazole** films in polyphosphoric acid)

IT 91-19-0D, Quinoxaline, derivs., polymers 95-16-9D, Benzothiazole, derivs., polymers 273-53-0D, Benzoxazole, derivs., polymers 289-06-5D, Thiadiazole, derivs., polymers 3097-03-8D, 5,5'-Bibenzimidazole, derivs., polymers 7258-75-5D, derivs., polymers 11120-54-0D, Oxadiazole, derivs., polymers 28279-47-2D, derivs., polymers 32109-42-5, Poly(2,5-benzimidazolediy) 50738-59-5D, derivs., polymers

RL: TEM (Technical or engineered material use); USES (Uses)

(preparation and use of **polyazole** films)

L22 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2003:319959 HCAPLUS

DN 138:339060

TI Crosslinkable aromatic resins having protonic acid groups, and ion conductive polymer membranes, binders, and fuel cells made by using the same

IN Ishikawa, Junichi; Kuroki, Takashi; Fujiyama, Satoko; Omi, Takehiko; Nakata, Tomoyuki; Okawa, Yuichi; Miyazaki, Kazuhisa; Fujii, Shigeharu; Tamai, Shoji

PA Mitsui Chemicals, Inc., Japan

SO PCT Int. Appl., 132 pp.

CODEN: PIXXD2

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003033566	A1	20030424	WO 2002-JP10536	20021010 <--
	W: CA, CN, IN, JP, KR, US				
	RW: DE, FR, GB, IT, SE				
	TW 236486	B1	20050721	TW 2002-91123279	20021009 <--
	CA 2463429	AA	20030424	CA 2002-2463429	20021010 <--
	EP 1457511	A1	20040915	EP 2002-775319	20021010 <--
	R: DE, FR, GB, IT, SE, SI, LT, LV, RO, MK, AL				
	CN 1630676	A	20050622	CN 2002-820224	20021010 <--
	US 2004191602	A1	20040930	US 2004-820842	20040409 <--
PRAI	JP 2001-312799	A	20011010	<--	
	JP 2002-182252	A	20020621	<--	
	WO 2002-JP10536	W	20021010	<--	

AB The invention relates to (A) a crosslinkable aromatic resin which has crosslinking groups and protonic acid groups and is suitable for electrolyte membranes and binders for fuel cells, (B) polymeric electrolyte membranes and binders for fuel cells, made by using the resin, and (C) fuel cells made by using the membranes or the binders. The aromatic resin has crosslinking groups which are not derived from protonic acid groups and are capable of causing crosslinking without the formation of a leaving component, and exhibits excellent ionic conductivity, heat resistance, water resistance, and adhesion, and low methanol permeability. It is preferable that the aromatic resin bears as the crosslinking groups both C1-10 alkyl bonded directly to an aromatic ring and carbonyl or carbon-carbon double or triple bonds, while preferred examples of the crosslinkable

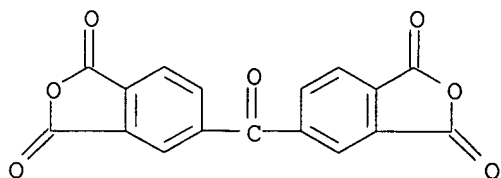
aromatic resin include aromatic polyether, aromatic polyamide, aromatic polyimide, aromatic polyamide-imide, and aromatic **polyazole**, each of which has crosslinking groups described above. Thus, 5,5'-carbonylbis(sodium 2-fluorobenzenesulfonate) obtained from 0.525 mol 4,4'-difluorobenzophenone and 210 mL 50% sulfuric acid 4.22, 4,4'-difluorobenzophenone 2.18, and 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane 5.69 g were reacted at 160° for 4 h in the presence of potassium carbonate to give 10.39 g polyether ketone powder with reduced viscosity 0.85 dL/g, glass transition temperature 230°, and 5% weight loss temperature 367°, which was applied on a glass and dried at 200° for 4 h to give a membrane with conductivity 0.018 S/cm at 30° and 0.065 S/cm at 90°.

IC ICM C08G0065-40
ICS C08G0069-48; C08G0073-10; C08J0005-22; H01M0008-02
CC 37-3 (Plastics Manufacture and Processing)
Section cross-reference(s): 38, 52
IT 25897-65-8P, Bisphenol A-4,4'-difluorobenzophenone copolymer
28825-50-5P, 3,3',4,4'-Benzophenonetetracarboxylic
dianhydride-3,3'-Diaminodiphenylsulfone copolymer 41205-96-3P
54571-77-6P 127583-87-3P 127669-56-1P 515144-54-4P 515144-55-5P
RL: IMF (Industrial manufacture); POF (Polymer in formulation); PRP
(Properties); TEM (Technical or engineered material use); PREP
(Preparation); USES (Uses)
(blend with protonic acid group-containing polymer; preparation of
crosslinkable
aromatic resins having protonic acid groups for ion conductive polymer
membranes, binders, and fuel cells)
IT **28825-50-5P, 3,3',4,4'-Benzophenonetetracarboxylic**
dianhydride-3,3'-Diaminodiphenylsulfone copolymer
RL: IMF (Industrial manufacture); POF (Polymer in formulation); PRP
(Properties); TEM (Technical or engineered material use); PREP
(Preparation); USES (Uses)
(blend with protonic acid group-containing polymer; preparation of
crosslinkable
aromatic resins having protonic acid groups for ion conductive polymer
membranes, binders, and fuel cells)
RN 28825-50-5 HCAPLUS
CN 1,3-Isobenzofurandione, 5,5'-carbonylbis-, polymer with
3,3'-sulfonylbis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 2421-28-5

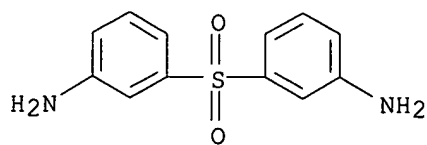
CMF C17 H6 O7



CM 2

CRN 599-61-1

CMF C12 H12 N2 O2 S



RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Commissariat A L'Energi	2001			WO 0125312 A	HCAPLUS
Commissariat A L'Energi	2001			JP 2000510511 A	
Commissariat A L'Energi	2001			US 200120082 A	
Commissariat A L'Energi	2001			FR 2799198 A	HCAPLUS
Hoechst Ag	1999			JP 11-502245 A	
Hoechst Ag	1999			WO 9629359 A	HCAPLUS
Kaneka Corp	2002			JP 2002105199 A	HCAPLUS
Kaneka Corp	2002			JP 2002121281 A	HCAPLUS
Sumitomo Electric Indus	2002			JP 2002358978 A	HCAPLUS
Sumitomo Electric Indus	2002			JP 2002367627 A	HCAPLUS
Victrex Manufacturing L	2000			WO 0015691 A	HCAPLUS
Victrex Manufacturing L	2000			JP 2002524631 A	

L22 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:807948 HCAPLUS

DN 137:312084

TI Proton-conductive membranes and their use

IN Calundann, Gordon; Sansone, Michael J.; Uensal, Oemer; Kiefer, Joachim

PA Celanese Ventures G.m.b.H., Germany

SO Ger. Offen., 8 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10117686	A1	20021024	DE 2001-10117686	20010409 <--
	CA 2443541	AA	20021107	CA 2002-2443541	20020409 <--
	WO 2002088219	A1	20021107	WO 2002-EP3900	20020409 <--
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	EP 1379573	A1	20040114	EP 2002-766620	20020409 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	BR 2002008795	A	20040309	BR 2002-8795	20020409 <--
	CN 1606585	A	20050413	CN 2002-807955	20020409 <--
	JP 2005536570	T2	20051202	JP 2002-585516	20020409 <--
	US 2004096734	A1	20040520	US 2003-472814	20031224 <--
PRAI	DE 2001-10117686	A	20010409	<--	
	WO 2002-EP3900	W	20020409	<--	

AB The title membranes, with high sp. conductivity (especially at high temps.) and useful

in fuel cells, are based on **polyazoles** prepared by spreading mixts. of aromatic tetraamines and aromatic polycarboxylic acids or their esters in polyphosphoric acid on supports, heating in inert gases at $\leq 350^\circ$, and treating the resulting membrane until it is

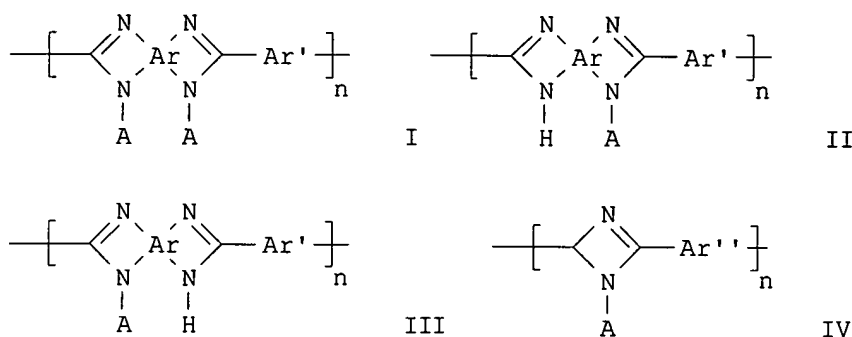
self-supporting. Preferred tetramines are 3,3',4,4'-biphenyltetramine, 2,3,5,6-pyridinetetramine, or their hydrochlorides, and preferred carboxylic acids are isophthalic and diphenylisophthalic acids.

IC ICM B01D0071-58
ICS H01M0008-02
CC 38-3 (Plastics Fabrication and Uses)
ST membrane proton conductive **polyazole**; fuel cell membrane proton conductive; tetramine arom copolymer membrane; **dicarboxylic** acid copolymer membrane; polyphosphoric acid **polyazole** membrane manuf; bibenzimidazole deriv polymer membrane
IT **Carboxylic acids, uses**
RL: TEM (Technical or engineered material use); USES (Uses)
(aromatic polybasic, polymers with aromatic tetramines; proton-conductive membranes and their use)
IT Amines, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(aromatic, tetra-, polymers with **dicarboxylic** acids; proton-conductive membranes and their use)
IT Polyphosphoric acids
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(**polyazole** membrane manufacture in polyphosphoric acid)

=> => d 137 bib abs retable tot

L37 ANSWER 1 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2006:563724 HCAPLUS
DN 145:46972
TI Functionalized with phosphonic acid derivatives **polyazols** for proton-conductive **polyazole** membranes.
IN **Uensal, Oemer**; Belack, Joerg; Muellen, Klaus; Klapper, Markus; Sukumar, Prabakaran; Schopov, Ivan; Sinigersky, Vesselin; Bratschkov, Christo; Schenkov, Stoicho; Markova, Dilyana
PA Pemeas G.m.b.H., Germany
SO Ger. Offen., 29 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	DE 102005057644	A1	20060614	DE 2005-102005057644	20051201
PRAI	DE 2004-102004057823	IA	20041201		
GI					



AB A proton conducting polymer membrane with operation temperature <0 - 200°, high elec. conductivity and hindered electrolyte out-washing are prepared from with phosphonic acid functionalized **polyazols** I - IV (Ar', Ar'' and Ar''' = 1-, 2- and 3-valent aromatic or heteroarom. groups, A = vinylphosphonic acid residue, such as ethenephosphonic acid, propenephosphonic acid, 2-phosphonomethylacrylic acid, 2-phosphonomethylmethacrylic acid, 2-phosphonomethylacrylamide or 2-phosphonomethylmethacrylamide) having P - N ratio ≥ 0.5 .

L37 ANSWER 2 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:612375 HCAPLUS

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DN      143:116546
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TI Proton-conducting membrane and use thereof

IN Uensal, Oemer; Christ, Gunter; Wirth, Kathrin

PA Pemeas G.m.b.H., Germany

SO PCT Int. Appl., 52 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005063862	A1	20050714	WO 2004-EP14829	20041230
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	DE 10361932	A1	20050728	DE 2003-10361932	20031230
	EP 1701995	A1	20060920	EP 2004-804414	20041230
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS				

PRAI	DE	2003-10361932	A	20031230
	WO	2004-EP14829	W	20041230

OS MARPAT 143:116546

AB Proton-conducting membranes based on **polyazoles** optionally having heterocyclic side chains with increased conductivity and decreased flash over for fuel cells are manufactured by melting ≥ 1 aromatic tetramine and

≥1 aromatic carboxylic acid or ester having ≥2 carboxylic acid groups or a mixture of ≥1 aromatic and(or) heterocyclic diaminocarboxylic acids at ≤350°, dissolving or dispersing the resulting prepolymer in organic phosphonic acid anhydrides, heating the resulting dispersion or solution at ≤350°, coating the dispersion or solution on a support, and removing from the support.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Calundann, G	2002			WO 02081547 A	HCAPLUS
Calundann, G	2002			WO 02088219 A	
Calundann, G	2003			WO 03022412 A	HCAPLUS
Center For Advanced Sci	2002			EP 1202365 A	HCAPLUS
Kiefer, J	2003			WO 03074597 A	HCAPLUS
Kiefer, J	2003			WO 03096464 A	HCAPLUS
Sansone	1997			US 5599639 A	HCAPLUS
Uensal, O	2003			WO 03074596 A	HCAPLUS
Uensal, O	2003			WO 03075389 A	HCAPLUS
Walsh	1986			US 4622276 A	HCAPLUS

L37 ANSWER 3 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:612368 HCAPLUS

DN 143:116542

TI Proton-conducting membranes based on **polyazoles** and use thereof

IN **Uensal, Oemer**; Leister, Ursula; Schlegel, Melanie

PA Pemeas G.m.b.H., Germany

SO PCT Int. Appl., 49 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005063852	A1	20050714	WO 2004-EP14831	20041230
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	DE 10361833	A1	20050804	DE 2003-10361833	20031230
	EP 1706442	A1	20061004	EP 2004-804416	20041230
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS				
PRAI	DE 2003-10361833	A	20031230		
	WO 2004-EP14831	W	20041230		

OS MARPAT 143:116542

AB Proton-conducting membranes based on **polyazoles** optionally having heterocyclic side chains with increased conductivity and decreased flash over for fuel cells are manufactured by dissolving or dispersing ≥1 aromatic tetramine and ≥1 aromatic carboxylic acid or ester having ≥2 carboxylic acid groups or a mixture of ≥1 aromatic and(or) heterocyclic diaminocarboxylic acids in organic phosphonic acid anhydrides, coating the dispersion or solution on a support or an electrode, and heating

at $\leq 350^\circ$.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Celanese Ventures	2003			DE 10220817 A	HCAPLUS
Celanese Ventures Gmbh	2003			WO 03092090 A	HCAPLUS
Celanese Ventures Gmbh	2003			DE 10210500 A	HCAPLUS
Celanese Ventures Gmbh	2004			DE 10235357 A	HCAPLUS

L37 ANSWER 4 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:612367 HCAPLUS

DN 143:116541

TI Proton-conducting **polyazole** membrane and use thereofIN **Uensal, Oemer**; Brehl, Kilian; Thiemer, Edmund

PA Pemeas G.m.b.H., Germany

SO PCT Int. Appl., 35 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2005063851	A1	20050714	WO 2004-EP14830	20041230
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
DE 10361832	A1	20050728	DE 2003-10361832	20031230
EP 1706441	A1	20061004	EP 2004-804415	20041230
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS				
PRAI DE 2003-10361832	A	20031230		
WO 2004-EP14830	W	20041230		

OS MARPAT 143:116541

AB Proton-conducting polymer membranes based on **polyazoles** with increased conductivity at $>100^\circ$ and decreased flashover for fuel cells are manufactured by heating solns. or dispersions of the polymers in organic phosphonic acid anhydrides at $\leq 400^\circ$ and forming membranes.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Celanese Ventures Gmbh	2003			WO 03092090 A	HCAPLUS
Celanese Ventures Gmbh	2003			WO 03096464 A	HCAPLUS

L37 ANSWER 5 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:140975 HCAPLUS

DN 142:179907

TI Production of crystalline pyrophosphates and their use as catalysts or additives in fuel cell membranes

IN **Calundann, Gordon**; **Benicewicz, Brian**

PA Pemeas G.m.b.H., Germany

SO PCT Int. Appl., 11 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005014474	A2	20050217	WO 2004-EP8857	20040806
	WO 2005014474	A3	20051027		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,				
	CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,				
	GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,				
	LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,				
	NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,				
	TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW:				
	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,				
	AZ, BY, BG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,				
	EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE,				
	SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE,				
	SN, TD, TG				
	DE 10336363	A1	20050303	DE 2003-10336363	20030808

PRAI DE 2003-10336363 A 20030808

AB Crystalline pyrophosphates M(P2O7) are produced by heating a hydrogen phosphate m(HPO4)2 nH2O in a suitable liquid medium, where M represents a tetravalent metal of the group IVa or IVb and n is a number from 0 to 20. The pyrophosphate has a particle size of 1-1000 nm. Preferably, M stands for Ti, Zr, Si, Sn, Ge or Sn, in particular for Ti or Zr. Polyphosphoric acid, phosphorus pentoxide and orthophosphoric acid, or their mixts. are preferably used as the liquid medium. The pyrophosphates produced are particularly suitable for use as additives in fuel cell membranes or for ceramics, or as catalysts in organic reactions, in particular alkylation, isomerization, esterification, or dehydrogenation reactions. The pyrophosphates may be used for the manufacture of proton-conducting polymer membranes containing **polyazoles**.

L37 ANSWER 6 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:99776 HCAPLUS

DN 142:201585

TI Proton-conducting membrane and use thereof

IN **Calundann, Gordon; Uensal, Oemer; Benicewicz, Brian;** Scanlon, Eugene

PA Pemeas GmbH, Germany

SO PCT Int. Appl., 41 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005011039	A2	20050203	WO 2004-EP8229	20040723
	WO 2005011039	A3	20050303		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,				
	CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,				
	GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,				
	LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,				
	NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,				
	TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW:				
	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,				
	AZ, BY, BG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,				
	EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE,				

SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE,
SN, TD, TG

EP 1652259 A2 20060503 EP 2004-763421 20040723
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK

US 2006210881 A1 20060921 US 2006-566135 20060127
PRAI EP 2003-17027 A 20030727
WO 2004-EP8229 W 20040723

AB The invention relates to a novel proton-conducting polymer membrane based on **polyazole** block polymers which can be used in a plurality of applications due to their excellent chemical and thermal properties and are particularly suitable as a polymer electrolyte membrane in the production of membrane electrode units for the above-mentioned PEM fuel cells.

L37 ANSWER 7 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:74144 HCAPLUS

DN 142:177343

TI Production and use of asymmetric polymer films

IN Petersen, Joachim; Baurmeister, Jochen; Uensal, Oemer;
Kiefer, Joachim

PA Pemeas G.m.b.H., Germany

SO PCT Int. Appl., 42 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005007725	A1	20050127	WO 2004-EP7570	20040709
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW,				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				

DE 10331365 A1 20050210 DE 2003-10331365 20030711
EP 1646674 A1 20060419 EP 2004-740851 20040709
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK

CN 1823114 A 20060823 CN 2004-80020003 20040709
PRAI DE 2003-10331365 A 20030711
WO 2004-EP7570 W 20040709

AB The title films, with good chemical, thermal, and mech. properties and especially useful as polymer electrolyte membranes for fuel cells, are prepared from **polyazoles** and have rough and smooth sides with roughness 3-10 and <2 µm, resp. An asym. **polyazole** membrane had contact angle with 85% H3PO4 <10° and >35° on the rough and smooth side, resp.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Fisher, E	2002			WO 0204083 A	HCAPLUS
General Electric Compan	1981			US 4272353 A	HCAPLUS
Monsanto Company	1985			EP 0141793 A	HCAPLUS

L37 ANSWER 8 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:510004 HCAPLUS

DN 141:54821

TI Manufacture of high-molecular-weight **polyazoles**

PA **Celanese Ventures GmbH, Germany**

SO Ger. Offen., 22 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10258580	A1	20040624	DE 2002-10258580	20021216
	CA 2509228	AA	20040701	CA 2003-2509228	20031202
	WO 2004055097	A1	20040701	WO 2003-EP13529	20031202
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	EP 1583789	A1	20051012	EP 2003-782267	20031202
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	BR 2003017338	A	20051108	BR 2003-17338	20031202
	CN 1732208	A	20060208	CN 2003-80106255	20031202
	JP 2006509867	T2	20060323	JP 2004-559737	20031202
PRAI	DE 2002-10258580	A	20021216		
	WO 2003-EP13529	W	20031202		

AB The polymers based on **polyazoles** (structures specified) having inherent viscosity ≥ 1.3 dL/g, useful for the production of fibers, films, membranes and molded articles, were manufactured (A) by mixing aromatic tetraamino compds. with aromatic carboxylic acids or esters comprising ≥ 2 carboxylic groups per monomer mol., or by mixing ≥ 1 (hetero)aromatic diaminocarboxylic acid, (B) heating the mixts. at $\leq 350^\circ$, preferably 300° under inert gas, (C) comminuting the resulting products and fractionating the particles, (D) heating the 300-1000- μm fraction to $\leq 450^\circ$, preferably 400° under inert gas, and cooling. Thus, a mixture of 214.27 g tetraaminobiphenyl and 166.14 g isophthalic acid was heated under N with stirring for 1 h at 150° , 1 h at 190° , 1 h at 250° and 1.5 h at 290° . The reaction mixture foamed strongly at 190 - 250° and the foam was crushed with the stirring device. After another 1.5 h at 290° the product was cooled and fractionated to give fractions with particles < 212 , 212-300, 300-500, 500-1000 and > 1000 μm . The fractions were polymerized by heating the individual fractions for 3 h at 380° under to give polymers having resp. intrinsic viscosities 0.56, 1.05, 1.40, 1.44 and 1.17.

L37 ANSWER 9 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:307315 HCAPLUS

DN 140:322528

TI Proton-conductive polymer membranes containing **polyazoles** and coated with catalyst layers for use in fuel cells

IN **Calundann, Gordon; Benicewicz, Brian; Baurmeister, Jochen; Kundler, Isabel; Weber, Mathias; Padberg, Christoph; Uensal, Oemer; Kiefer, Joachim**

PA **Celanese Ventures GmbH, Germany**

SO Ger. Offen., 25 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10246372	A1	20040415	DE 2002-10246372	20021004
	CA 2500774	AA	20040422	CA 2003-2500774	20031002
	WO 2004034498	A2	20040422	WO 2003-EP10903	20031002
	WO 2004034498	A3	20050512		
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
EP	1559162	A2	20050803	EP 2003-756472	20031002
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
US	2006079392	A1	20060413	US 2005-530242	20050606
PRAI	DE 2002-10246372	A	20021004		
	WO 2003-EP10903	W	20031002		

AB The title membranes, which are inexpensive, are easily prepared by heating **polyazole** precursors in polyphosphoric acid under inert gases to $\leq 400^\circ$, applying layers of the resulting mixture to substrates, treating the film until it is self-supporting, and applying a layer of catalyst. Preferred catalytic materials are Pt, Pd, Au, Rh, Ir, and/or Ru.

L37 ANSWER 10 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:305018 HCAPLUS

DN 140:305096

TI Proton-conductive polymer membranes containing **polyazole** blends for use in fuel cells

IN Calundann, Gordon; Sansone, Michael; Benicewicz, Brian; Choe, Eui Won; Uensal, Oemer; Kiefer, Joachim

PA Celanese Ventures GmbH, Germany

SO Ger. Offen., 24 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10246461	A1	20040415	DE 2002-10246461	20021004
	CA 2500792	AA	20040422	CA 2003-2500792	20031002
	WO 2004034500	A2	20040422	WO 2003-EP10905	20031002
	WO 2004034500	A3	20050512		
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
EP	1559164	A2	20050803	EP 2003-775168	20031002
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
JP	2006502266	T2	20060119	JP 2004-542402	20031002
CN	1742402	A	20060301	CN 2003-80100916	20031002
US	2006078774	A1	20060413	US 2005-530226	20050826
PRAI	DE 2002-10246461	A	20021004		
	WO 2003-EP10905	W	20031002		

AB The title membranes, which are economical, are easily prepared by heating solns. of **polyazoles** or **polyazole** precursors and other polymers (ratio 0.1-50:1) in polyphosphoric acid at $\leq 400^\circ$ under inert gases, coating the solution on a support, and treating the film until it is self-supporting.

L37 ANSWER 11 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:117171 HCAPLUS
 DN 140:165009
 TI Proton-conductive **polyazole** membranes containing phosphonic acid
 group-containing polymers and their application in fuel cells
 IN Calundann, Gordon; Uensal, Oemer; Kiefer,
 Joachim
 PA Celanese Ventures GmbH, Germany
 SO Ger. Offen., 32 pp.
 CODEN: GWXXBX
 DT Patent
 LA German
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10235358	A1	20040212	DE 2002-10235358	20020802
	CA 2494330	AA	20040219	CA 2003-2494330	20030731
	WO 2004015802	A1	20040219	WO 2003-EP8461	20030731
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,				
	IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	EP 1527493	A1	20050504	EP 2003-784120	20030731
	EP 1527493	B1	20060104		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				
	IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	CN 1675790	A	20050928	CN 2003-818584	20030731
	JP 2005534784	T2	20051117	JP 2004-526830	20030731
	AT 315278	E	20060215	AT 2003-784120	20030731
	US 2005244694	A1	20051103	US 2005-522839	20050606
PRAI	DE 2002-10235358	A	20020802		
	WO 2003-EP8461	W	20030731		

AB The present invention concerns proton-conductive polymer membranes
 phosphonic acid group-containing polymers, available by a procedure,
 comprising the steps: (A) mixing one or more aromatic tetra amino compds.
 with one or more aromatic carboxylic acids and/or their esters, which contain
 at least two acid radicals , or mixing one or more aromatic and/or
 heteroarom. diaminocarboxylic acids, in . vinyl-containing phosphonic acids to
 form a solution and/or a dispersion, (B) heating the solution and/or dispersion
 from step (A) under inert gas to temps. of $\leq 350^\circ$ to form a
polyazole, (C) applying a layer using the mixture in accordance with
 step (A) and/or (B) on a carrier, and (D) polymerization of the vinyl-containing
 phosphonic acids existing in the layer from step (C).

L37 ANSWER 12 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:117170 HCAPLUS
 DN 140:165008
 TI Proton-conductive **polyazole** membranes containing polymers having
 phosphonic acid and sulfonic acid groups and their application in fuel
 cells
 IN Calundann, Gordon; Uensal, Oemer; Kiefer,
 Joachim
 PA Celanese Ventures GmbH, Germany
 SO Ger. Offen., 32 pp.
 CODEN: GWXXBX
 DT Patent
 LA German
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10235357	A1	20040212	DE 2002-10235357	20020802

CA 2494530 AA 20040219 CA 2003-2494530 20030731
 WO 2004015803 A1 20040219 WO 2003-EP8462 20030731
 W: BR, CA, CN, JP, KR, MX, US
 RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
 IT, LU, MC, NL, PT, RO, SE, SI, SK, TR
 EP 1527494 A1 20050504 EP 2003-784121 20030731
 EP 1527494 B1 20051228
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK
 CN 1682400 A 20051012 CN 2003-821477 20030731
 JP 2005534785 T2 20051117 JP 2004-526831 20030731
 AT 314735 E 20060115 AT 2003-784121 20030731
 US 2005244695 A1 20051103 US 2005-523373 20050323
 PRAI DE 2002-10235356 A 20020802
 DE 2002-10235357 A 20020802
 WO 2003-EP8462 W 20030731
 AB The present invention concerns proton-conductive polymer membranes containing
 polymers having sulfonic acid and phosphonic acid groups, available by a
 procedure, comprising the steps: (A) mixing one or more aromatic tetra amino
 compds. with one or more aromatic carboxylic acids and/or their esters, which
 contain at least two acid radicals, or mixing one or more aromatic and/or
 heteroarom. diaminocarboxylic acids, in mixts. containing vinyl-containing
 sulfonic acids and vinyl-containing phosphonic acids to form a solution and/or a
 dispersion, (B) heating the solution and/or dispersion from step (A) under
 inert gas to temps. of $\leq 350^\circ$ to form a **polyazole**,
 (C) applying a layer using the mixture in accordance with step (A) and/or
 (B) on a carrier, and (D) polymerization of the vinyl-containing sulfonic acids
 and
 vinyl-containing phosphonic acids existing in the layer from step (C).
 L37 ANSWER 13 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:117169 HCAPLUS
 DN 140:165007
 TI Proton-conductive polymer membrane based on sulfonic acid-containing
 polymers and their application in fuel cells
 PA **Celanese Ventures GmbH, Germany**
 SO Ger. Offen., 31 pp.
 CODEN: GWXXBX
 DT Patent
 LA German
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10235356	A1	20040212	DE 2002-10235356	20020802
	CA 2494530	AA	20040219	CA 2003-2494530	20030731
	WO 2004015803	A1	20040219	WO 2003-EP8462	20030731
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	EP 1527494	A1	20050504	EP 2003-784121	20030731
	EP 1527494	B1	20051228		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
	CN 1682400	A	20051012	CN 2003-821477	20030731
	AT 314735	E	20060115	AT 2003-784121	20030731
	US 2005244695	A1	20051103	US 2005-523373	20050323
PRAI	DE 2002-10235356	A	20020802		
	DE 2002-10235357	A	20020802		
	WO 2003-EP8462	W	20030731		
AB	The present invention concerns proton-conductive polymer membranes containing				

sulfonic acid-containing polymers, available by a procedure, comprising the steps: (A) mixing one or more aromatic tetra amino compds. with one or more aromatic carboxylic acids and/or their esters, which contain at least two acid radicals, or mixing one or more aromatic and/or heteroarom. diaminocarboxylic acids, in a vinyl-containing sulfonic acid to form a solution and/or a dispersion, (B) heating the solution and/or dispersion from step (A) under inert gas to temps. of $\leq 350^\circ$ to form a **polyazole**, (C) applying a layer using the mixture in accordance with step (A) and/or (B) on a carrier, and (D) polymerization of the vinyl-containing sulfonic acid existing in the layer from step (C).

L37 ANSWER 14 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:95339 HCAPLUS

DN 140:129255

TI Procedure for the treatment of **polyazole** films/foil

PA **Celanese Ventures G.m.b.H., Germany**

SO Ger. Offen., 16 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10234236	A1	20040205	DE 2002-10234236	20020727
	CA 2496388	AA	20040212	CA 2003-2496388	20030725
	WO 2004013211	A1	20040212	WO 2003-EP8250	20030725
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
EP	1527123	A1	20050504	EP 2003-766306	20030725
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
CN	1671777	A	20050921	CN 2003-818044	20030725
JP	2006501321	T2	20060112	JP 2004-525327	20030725
US	2006167219	A1	20060727	US 2005-522503	20050627
PRAI	DE 2002-10234236	A	20020727		
	WO 2003-EP8250	W	20030725		

AB Treatment of **polyazole** films to remove solvents is based on repeated (at least twice) dipping of **polyazole** (mostly polybenzimidazole) films into liquid (mostly water or acid) using a jigger, in which changing the direction of rotation of the spools changes the running direction of the films. Triple dipping (5 s each time) 20 m PBI foil, containing 20 weight% of DMAc into water at 80° with WJ 650 jigger (Fa. Mathis AG) leads to full removing of DMAc from the foil.

L37 ANSWER 15 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:36661 HCAPLUS

DN 140:77589

TI Functionalized **polyazoles** and method of their manufacturing

IN Muellen, Klaus; Klapper, Markus; Sinigersky, Vesselin; Wu, Weicheng;

Uensal, Oemer; Baurmeister, Jochen

PA **Celanese Ventures GmbH, Germany**

SO Ger. Offen., 21 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10230477	A1	20040115	DE 2002-10230477	20020706

CA 2491930 AA 20040115 CA 2003-2491930 20030702
 WO 2004005373 A1 20040115 WO 2003-EP7020 20030702
 W: BR, CA, CN, JP, KR, MX, US
 RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
 IT, LU, MC, NL, PT, RO, SE, SI, SK, TR
 EP 1521796 A1 20050413 EP 2003-740399 20030702
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK
 CN 1756790 A 20060405 CN 2003-818965 20030702
 JP 2006516294 T2 20060629 JP 2004-518655 20030702
 PRAI DE 2002-10230477 A 20020706
 WO 2003-EP7020 W 20030702
 AB Functionalized **polyazoles**, containing recurring imidazole units,
 such as polybenzimidazoles useful for manufacturing membranes for fuel cells,
 are processed by dissolving **polyazoles** in basic solvent (usually
 in N,N-dimethylacetamide) with deprotonation which is followed by reacting
 with phosphonates and casting the solns. to form films, which can be doped
 with acid to increase conductivity
 L37 ANSWER 16 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN
 AN 2004:20744 HCAPLUS
 DN 140:78247
 TI Proton-conducting membranes from sulfonated **polyazoles** useful in
 fuel cells
 IN Calundann, Gordon; Sansone, Michael J.; Uensal,
 Oemer; Kiefer, Joachim
 PA Celanese Ventures GmbH, Germany
 SO PCT Int. Appl., 44 pp.
 CODEN: PIXXD2
 DT Patent
 LA German
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004003061	A1	20040108	WO 2003-EP6308	20030614
W: BR, CA, CN, JP, KR, MX, US				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
DE 10228657	A1	20040115	DE 2002-10228657	20020627
CA 2491239	AA	20040108	CA 2003-2491239	20030614
EP 1519981	A1	20050406	EP 2003-740253	20030614
EP 1519981	B1	20060628		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, SK				
CN 1697852	A	20051116	CN 2003-820238	20030614
JP 2006507372	T2	20060302	JP 2004-516602	20030614
AT 331753	E	20060715	AT 2003-740253	20030614
US 2006057449	A1	20060316	US 2005-519281	20050804
PRAI DE 2002-10228657	A	20020627		
WO 2003-EP6308	W	20030614		

 AB A proton-conducting polymer membrane based on aromatic **polyazoles**
 containing sulfonic acid groups covalently linked to the aromatic rings are
 produced by a process comprising the steps of (a) mixing one or more
 tetraamino-substituted aromatic compds. with one or more aromatic carboxylic
 acids or esters, the acids comprising at least two acid groups per monomer
 mol., or mixing one or more aromatic and/or heteroarom. diaminocarboxylic
 acids, with a mixture of polyphosphoric acid and a sulfonating agent forming
 a solution and/or a dispersion, (b) forming a layer of the mixture (a) on a
 substrate or an electrode, (c) heating the layer under an inert gas to
 temperature of 340°, preferably to 280°, forming **polyazole**

polymers, and (d) subjecting the membrane to further treatment. The films have excellent chemical and thermal properties and can be used for producing polymer electrolyte membranes for fuel cells. Thus, isophthalic acid (26.948) and 3,3',4,4'-tetraaminobiphenyl (34.74) were added to polyphosphoric acid (83.4% of P2O5, 938.6 g), the mixture was heated at 120° for 2 h, at 150° for 3 h and at 180° for 14 h resulting in a 5%-solution of the polybenzimidazole in polyphosphoric acid. Phosphoric acid (85%, 22.34) and sulfuric acid (96%, 1.66 g) were added into the polybenzimidazole solution (100 g) at 220° over 30 min, the solution was stirred at 220° for 4 h, and applied on a glass substrate at 220° forming a transparent membrane.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Madison, N	1993			US 5218076 A	HCAPLUS
Osaheni, J	1995	28	1172	MACROMOLECULES	HCAPLUS
Savinell, R	1996			US 5525436 A	HCAPLUS
Yoshio, I	1967			US 3313783 A	

L37 ANSWER 17 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2003:221564 HCAPLUS

DN 138:256226

TI Proton-conducting membranes and their use

IN Calundann, Gordon; Sansone, Michael J.; Uensal, Oemer; Kiefer, Joachim

PA Celanese Ventures GmbH, Germany

SO PCT Int. Appl., 28 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003022412	A2	20030320	WO 2002-EP9629	20020829
WO 2003022412	A3	20030912		
W: BR, CA, CN, JP, KR, MX, US				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR				
DE 10144815	A1	20030327	DE 2001-10144815	20010912
CA 2459775	AA	20030320	CA 2002-2459775	20020829
EP 1427517	A2	20040616	EP 2002-764864	20020829
EP 1427517	B1	20050126		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR, BG, CZ, EE, SK				
CN 1555289	A	20041215	CN 2002-817937	20020829
AT 287760	E	20050215	AT 2002-764864	20020829
ES 2236573	T3	20050716	ES 2002-2764864	20020829
JP 2005536571	T2	20051202	JP 2003-526533	20020829
US 2005053820	A1	20050310	US 2004-489385	20041021
PRAI DE 2001-10144815	A	20010912		
WO 2002-EP9629	W	20020829		

AB The title membranes, with high sp. conductivities, especially at temps. >100°, and especially useful in fuel cells (no data), are prepared by dissolving **polyazoles** in polyphosphoric acid (I) at ≤400°, casting the solns. on supports, and treating the resulting membrane until it is self-supporting. A solution of 10 g polybenzimidazole (inherent viscosity 0.92 dL/g) in 90 g I (P2O5 content 83.4%) was prepared under N at 270°, thinned with 33.33 g 85% H3PO4, cooled to 240°, cast on a glass plate preheated to 100° to a

150 μm film, and left for 3 days under ambient conditions (resulting in hydrolysis of I) to give a mech. stable film with inherent viscosity 1.68 dL/g and sp. conductivity 0.115 and 0.128 S/cm at 25 and 160°, resp.

L37 ANSWER 18 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:977887 HCAPLUS

DN 138:40435

TI **Polyazole**-based polymer films

IN **Kiefer, Joachim; Uensal, Oemer;** Baurmeister, Jochen;
Jordt, Frauke

PA **Celanese Ventures GmbH, Germany**

SO PCT Int. Appl., 30 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002102881	A1	20021227	WO 2002-EP6773	20020619
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	DE 10129458	A1	20030102	DE 2001-10129458	20010619
	CA 2449239	AA	20021227	CA 2002-2449239	20020619
	EP 1404745	A1	20040407	EP 2002-748797	20020619
	EP 1404745	B1	20041201		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	CN 1516717	A	20040728	CN 2002-812093	20020619
	JP 2004534882	T2	20041118	JP 2003-506350	20020619
	AT 283888	E	20041215	AT 2002-748797	20020619
	ES 2233839	T3	20050616	ES 2002-2748797	20020619
	US 2004262227	A1	20041230	US 2004-481170	20040805
PRAI	DE 2001-10129458	A	20010619		
	WO 2002-EP6773	W	20020619		

AB Polymers with good chemical, thermal, and mech. properties, useful as membranes (e.g., for fuel cells), are processed by dissolving **polyazoles** (particle size 300-1500 μm) in polar, aprotic solvents, casting the solns. to form films, and drying the film until it is self-supporting. A powdered polybenzimidazole (Celazole) was classified and the fraction (15%) with particle size 500-750 μm was used to prepare a film with elastic modulus 2875 MPa, tensile strength 149 MPa, elongation 49%, and fracture toughness 2528 kJ/m²; vs. 2850, 147, 42, and 2268, resp., for a film prepared from unclassified polymer.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Calundann, G	1992			US 5091087 A	HCAPLUS
Chen, P	1986			US 4628067 A	HCAPLUS
Hoechst Japan	1998			EP 0816415 A	HCAPLUS
Kurschus, D	1993			US 5247010 A	HCAPLUS

L37 ANSWER 19 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:793682 HCAPLUS

DN 137:311964

TI Proton-conducting membrane and the use thereof for fuel cells

IN **Calundann, Gordon; Sansone, Michael J.; Uensal, Oemer; Kiefer, Joachim**

PA **Celanese Ventures G.m.b.H., Germany**

SO PCT Int. Appl., 51 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002081547	A1	20021017	WO 2002-EP3901	20020409
	W: BR, CA, CN, JP, KR, MX, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	DE 10117687	A1	20021017	DE 2001-10117687	20010409
	CA 2443849	AA	20021017	CA 2002-2443849	20020409
	EP 1379572	A1	20040114	EP 2002-745222	20020409
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	CN 1511170	A	20040707	CN 2002-807954	20020409
	BR 2002008728	A	20040720	BR 2002-8728	20020409
	JP 2005536569	T2	20051202	JP 2002-579927	20020409
	US 2004127588	A1	20040701	US 2004-472810	20040210
PRAI	DE 2001-10117687	A	20010409		
	WO 2002-EP3901	W	20020409		

AB Proton-conducting membranes based on **polyazoles**, useful as polymer electrolyte membranes in fuel cells at >100°, are manufactured by dissolving the **polyazoles** in polyphosphoric acid and forming membranes.

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Osaheni, J	1995	28	1172	MACROMOLECULES	HCAPLUS
Savinell, R	1996			US 5525436 A	HCAPLUS
Yoshio, I	1967			US 3313783 A	

L37 ANSWER 20 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:671689 HCAPLUS

DN 137:203963

TI Manufacture and application of polymer membranes

IN Uensal, Oemer; Kiefer, Joachim; Baurmeister, Jochen;

Pawlik, Juergen; Kraus, Werner; Jordt, Frauke

PA Celanese Ventures GmbH, Germany

SO Ger. Offen., 10 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10109829	A1	20020905	DE 2001-10109829	20010301
	CA 2439541	AA	20020912	CA 2002-2439541	20020301
	WO 2002071518	A1	20020912	WO 2002-EP2216	20020301
	W: BR, CA, CN, JP, KR, MX, US, ZA				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	EP 1368845	A1	20031210	EP 2002-748325	20020301
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	CN 1494745	A	20040505	CN 2002-805789	20020301
	JP 2005512271	T2	20050428	JP 2002-570329	20020301
	US 2004247974	A1	20041209	US 2004-468385	20040621

PRAI DE 2001-10109829 A 20010301
 WO 2002-EP2216 W 20020301

AB A **polyazole** form the basis of this acid-doped polymer membrane.
 A film is cast using a **polyazole** solution in a polar aprotic organic solvent. The film is dried to a self-supporting structure and treated with a liquid at a temperature between room temperature and the b.p. of the liquid. The treatment liquid is allowed to drain off or evaporate from the film and then it is doped. Due to the mech. characteristics of these membranes they have many uses and is particularly suitable as polymer electrolyte membranes in PEM fuel cells.

L37 ANSWER 21 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:353518 HCAPLUS

DN 136:370504

TI Production of solutions of polymers containing recurring azole units
 IN Guth, Thomas; Pawlik, Juergen; Tiefenstaedter, Reiner; Brendel, Peter; Jordt, Frauke

PA **Celanese Ventures G.m.b.h., Germany**

SO PCT Int. Appl., 24 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002036661	A1	20020510	WO 2001-EP12146	20011020
W: BR, CA, CN, JP, KR, MX, US, ZA				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
DE 10052237	A1	20020801	DE 2000-10052237	20001021
CA 2426224	AA	20030417	CA 2001-2426224	20011020
EP 1330485	A1	20030730	EP 2001-992732	20011020
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
BR 2001014739	A	20031223	BR 2001-14739	20011020
CN 1503817	A	20040609	CN 2001-819775	20011020
JP 2004532285	T2	20041021	JP 2002-539414	20011020
US 2004127633	A1	20040701	US 2004-399600	20040210
US 6998464	B2	20060214		
PRAI DE 2000-10052237	A	20001021		
WO 2001-EP12146	W	20011020		

AB In the title process, useful in preparation of membranes, polymers of specified structure with recurrent azole units ($\leq 90\%$ with particle size < 1 mm) are dissolved in heated AcNMe₂ of adequate dryness in an inert atmospheric A polybenzimidazole was milled to particle size (90%) $< 300 \mu\text{m}$, dried at $95-110^\circ$ in vacuo, stirred (800 g) in 3644 g AcNMe₂ (H₂O content 0.27%) at 260° for 3.5 h, cooled to 100° , and filtered (5 μm) to give a 14.5% solution

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Hoechst Japan	1998			EP 0816415 A	HCAPLUS
Ogata, N	1997			US 5599639 A	HCAPLUS

L37 ANSWER 22 OF 22 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:329259 HCAPLUS

DN 136:341790

TI Production and use of blends of polymers with recurring azole units in

acid-doped, (multi)layer membranes/diaphragms
 IN Guth, Thomas; Jordt, Frauke; Kiefer, Joachim
 PA Celanese Ventures G.m.b.H., Germany
 SO Ger. Offen., 12 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10052242	A1	20020502	DE 2000-10052242	20001021
	WO 2002036249	A1	20020510	WO 2001-EP12147	20011020
	WO 2002036249	C2	20020919		
	W: BR, CA, CN, JP, KR, MZ, US, ZA				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	CA 2425683	AA	20030417	CA 2001-2425683	20011020
	EP 1337319	A1	20030827	EP 2001-978444	20011020
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	BR 2001014764	A	20031007	BR 2001-14764	20011020
	JP 2005513168	T2	20050512	JP 2002-539051	20011020
	US 2004131909	A1	20040708	US 2004-399514	20040210
PRAI	DE 2000-10052242	A	20001021		
	WO 2001-EP12147	W	20011020		

AB The title products, which can be produced economically on an industrial scale, have ≥ 1 layer of a blend of 0.1-99.9% polymer containing azole units of specified structure and 99.9-0.1% (polyether-)polysulfones of specified structure. A 15% AcNMe₂ solution of polybenzimidazole (Celazole) and a 15% AcNMe₂ solution of polysulfone (Radel R) were mixed 90:10 at 60-95°, cast (250 μ m) on glass, degassed, and dried at $\leq 120^\circ$ to give a film which was doped in 85% H₃PO₄ at room temperature for 72 h to give a membrane with elec. resistance 2392 Ω and elec. conductivity 0.072 S/cm.

RETABLE

	Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Anon					EP 0688824 A2	HCAPLUS
Anon					DE 19847782 A1	HCAPLUS

=> d his

(FILE 'REGISTRY' ENTERED AT 07:19:50 ON 11 OCT 2006)

E C7H8N2O5S/MF

L1 2 S E3 AND C6/ES AND 1/NR AND DIAMINO

L2 13 S 554-95-0 OR 89-05-4 OR 863495-62-9 OR 128-97-2 OR 536-20-9 OR

FILE 'HCAPLUS' ENTERED AT 07:32:53 ON 11 OCT 2006

ACT WANG529/A

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L3 (      87)SEA FILE=HCAPLUS ABB=ON  PLU=ON  POLYAZOLE
L4 (      1)SEA FILE=HCAPLUS ABB=ON  PLU=ON  POLY AZOLE
L5 (     126)SEA FILE=HCAPLUS ABB=ON  PLU=ON  ?POLYAZOL? OR ?POLY AZOL?
L6      126 SEA FILE=HCAPLUS ABB=ON  PLU=ON  (L3 OR L4 OR L5)

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L7      0 S L6 AND L1
L8      1 S L6 AND L2
L9      6 S L6 AND CARBOXYL?/CW,CT

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L10 1 S L6 AND ?TRICARBOXYL?
 L11 2 S L6 AND ?TETRACARBOXYL?
 L12 6 S L6 AND ?DICARBOXYL?
 L13 9 S L8-L12
 L14 9 S L13 AND (PY<=2002 OR PRY<=2002 OR AY<=2002)
 L15 2 S L14 AND L8,L10,L11
 L16 6 S L14 AND (CALUNDANN ? OR BENICEWICZ ? OR UENSAL ? OR KIEFER ?
 L17 6 S L14 AND CELANESE?/PA,CS
 L18 7 S L15-L17
 L19 2 S L14 NOT L18

FILE 'REGISTRY' ENTERED AT 07:42:48 ON 11 OCT 2006

L20 1 S 28825-50-5

FILE 'HCAPLUS' ENTERED AT 07:43:08 ON 11 OCT 2006

L21 1 S L20 AND L18

L22 7 S L18,L21

ACT WANG529A/A

L23 (1)SEA FILE=HCAPLUS ABB=ON PLU=ON US20060183012/PN OR (US2005-52
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 L25 (241)SEA FILE=HCAPLUS ABB=ON PLU=ON ("KIEFER J"/AU OR "KIEFER J A"
 L26 (86)SEA FILE=HCAPLUS ABB=ON PLU=ON ("CALUNDANN G"/AU OR "CALUNDAN
 L27 (1)SEA FILE=HCAPLUS ABB=ON PLU=ON SANSONE/AU
 L28 (102)SEA FILE=HCAPLUS ABB=ON PLU=ON ("SANSONE M"/AU OR "SANSONE M
 L29 (128)SEA FILE=HCAPLUS ABB=ON PLU=ON ("BENICEWICZ B"/AU OR "BENICEW
 L30 (102)SEA FILE=HCAPLUS ABB=ON PLU=ON ("CHOE E"/AU OR "CHOE E W"/AU
 L31 (8323)SEA FILE=HCAPLUS ABB=ON PLU=ON CELANESE?/PA,CS
 L32 (87)SEA FILE=HCAPLUS ABB=ON PLU=ON POLYAZOLE
 L33 (1)SEA FILE=HCAPLUS ABB=ON PLU=ON POLY AZOLE
 L34 (126)SEA FILE=HCAPLUS ABB=ON PLU=ON ?POLYAZOL? OR ?POLY AZOL?
 L35 (126)SEA FILE=HCAPLUS ABB=ON PLU=ON (L32 OR L33 OR L34)
 L36 28 SEA FILE=HCAPLUS ABB=ON PLU=ON (L23 OR L24 OR L25 OR L26 OR L

L37 22 S L36 NOT L22

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